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acc. 282,931

1936

April 1969.

Tutuila. Samoa - Collecting for the
Smithsonian Institute.

Station I - - The bay of Pago Pago
is in a sunken volcanic crater
and on the west shore stands Coast
Island - There are heavy lava stone
breakwaters here with a sandy beach
which was probably manufactured -

First collection consisted of many
small shore shells - small moon
shells - clams - strambus - cauriss -

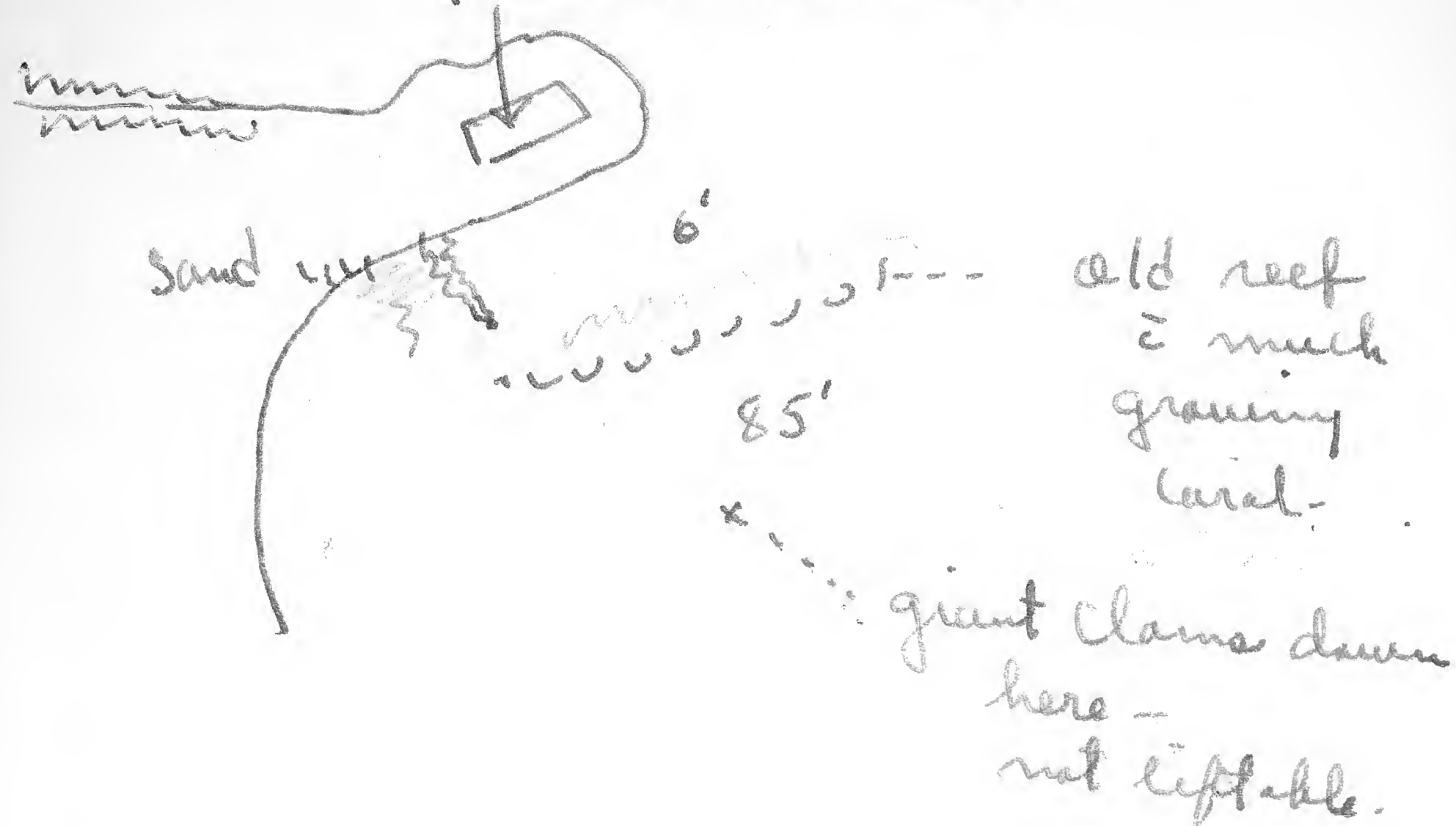
There were picked up - on
April 20 - 21 - 1969 -

29 April - Snorkeling - 1 hr - some
dead specimen observed - 2 - 3 1/2 cm
cauriss and 6 cm orange + black cone -
Taken.

7 May Snorkeling - 1 hr - several
small ring cauriss taken at 6' - one
Cone - several large old cones
inhabited by crabs.

Pago bay -

Intercant mental Hotel



The bay to north of intercontinental hotel is being dredged - on May 2 this was searched - Low tide -

A number of old shells found - many *Isabella* *Canus* - *Canus* ~~*Geophagus*~~ ^{*Isabella*} etc but no living material -

Water in the bay area is turbid & even over the edge of the reef it is turbid with micro organisms -

The reef area has been searched repeatedly - again on 31 July - The following found in 1 hr - *C. erosa* - (10) - *C. isabella* - *C. Aribeca* (2) - *Canus striatus*, *Canus testis* -, *Canus episcopus* - *C. lividus* *C. varius* - One olive (empty) - Tide was out & these were found in 3' water just inside the reef - none preserved -

Station 2 -

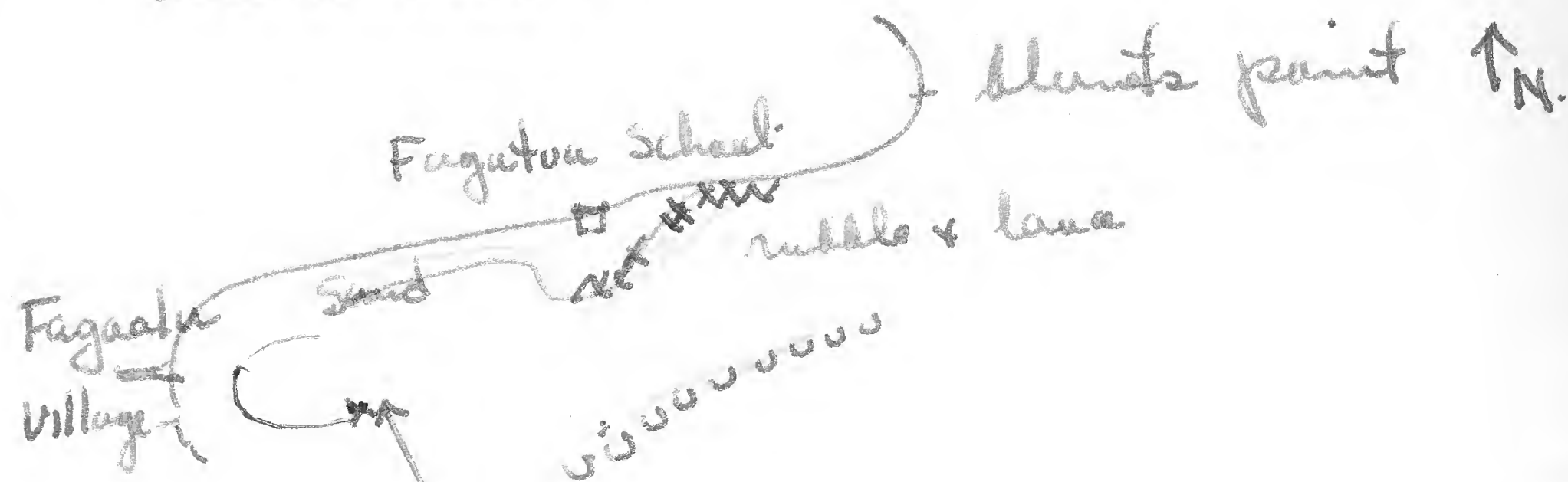
Tutuila Island - This is a shore behind an off shore reef at the entrance of Pago Pago harbor. The land runs NE to SW - bank is lava rock with some sand beach but also served as a dump probably by many many years ago - there are old rusty engines etc - now called Fagatua school area - (Faga'alu).

About 100 yds off shore is a reef of coral break down with very little living coral - at low tide - 6" above mean low this was inspected on 26 April - Some rocks were above water but there was considerable current and the area seemed rather sterile - no specimens recovered in one hour search -

The area between the rocks & shore had coral break down bottom with rather a swift current to the SW - Some small nerites found.

The shore area was collected on 22 thru 26 April at high and low tide - 18" difference - and

16 specimen jars filled with nerites and various mollusks abundant enough so that 6-20 of each could be collected with ease -



area has been dredged for road material - this area is almost devoid of mollusk remains and no specimens found.

2 May 69 - 1 1/2 hr search - low tide - One *Cassiope* *Cypentserpentis* - found - "Young Samoa had & arabian (C. arabica) he had found = many small bivalves & gastropods found under coral - in 12" of water - Small quantity also found under shore rocks - Low tide.

15 July - The entire family spent 1 1/2 hrs here - finding the usual reef shells - The sandy shore reveals small bivalves and occasionally other

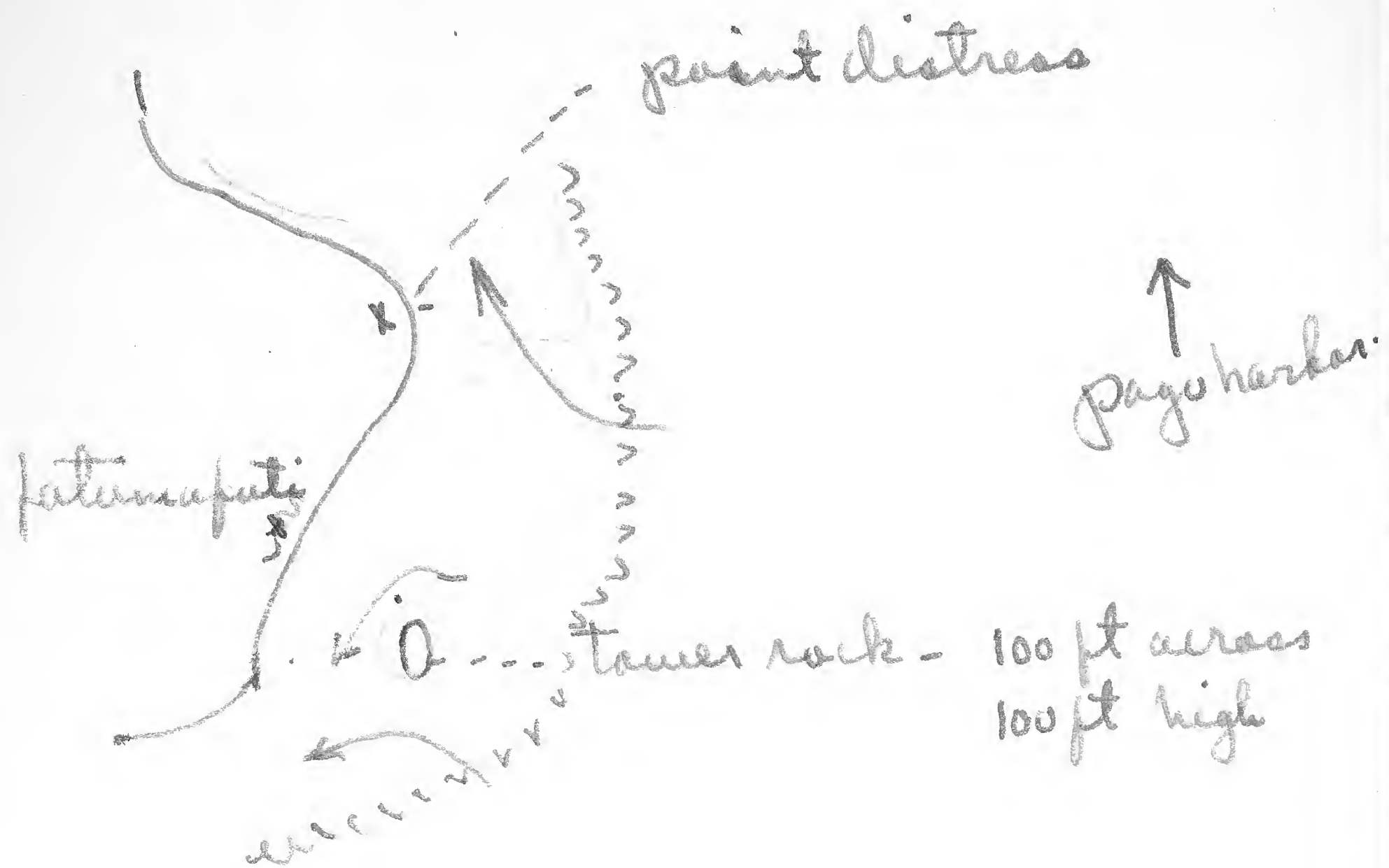
things - a good shore shell identified as
Comus quercina

19 Aug - On numerous occasions we
have walked this beach, not finding
much - On this day at mid tide
the area was snorkled for $1\frac{1}{2}$ hrs.
There was a sandy plateau in which there
were *Terebra*, *Comus litteratus* & *quercina*
Pinna, none very frequent - an
assortment of these was gathered &
preserved in alcohol -

III

Tutuila Samoa, Station 3 -
collected - April - 69 -
Paint Distress Area -

The shore is lined with heavy lava
boulders - This was collected on
24 April - and some nitetime
specimens found however on 26th
April - nitetime low tide collection
trip of one hour produced nothing
of interest -
off shore for 200 yds to reef edge is
coral break down with rough solid
coral washed by a strong current
This is estimated at 4-5 knots
at low tide with a moderate to low
surf - very little living coral -
very few holothurians or other forms
of marine life seen - numerous
nerites and tidal species on the lava
rocks in same distribution as in
station 2 - not collected -



IV.

Tutuila - Samoa - Station 4.

^{Coconut}
~~Passage~~ point - This is a spit of land projecting almost a mile south from the land - It is narrow and low built entirely on coral - The area collected was on the east side of the tip of this peninsula -

There was a wide sandy beach almost devoid of shells - The coral was living in part but most of the bottom was crumbly brown leafy structures the true nature of which I didn't know - There were many holothurians of several varieties some being 4' long, there were large blue star fish with a moderate number of mollusks - but almost as many bottles - beer cans - old shoes There were occasional sandy patches

leafy coral *

limbkin



Collected 24 Apr. 69 - low tide - 6 to 8 PM.

There were many *Bulla angulata* - Linné - mostly with hermit crabs - One Tun collected - many sea urchins -

13 May 69 - 12:30 - 2³⁰ PM - low tide at 11³⁰

Area to west is flat sandy beach 6 - 12" water - Still a heavy wind made ripples obscuring trails & made water turbid - Many small Stromatolae found & collected - marked TV 6. By time the "a" area was reached the

water was too rough & turbid -

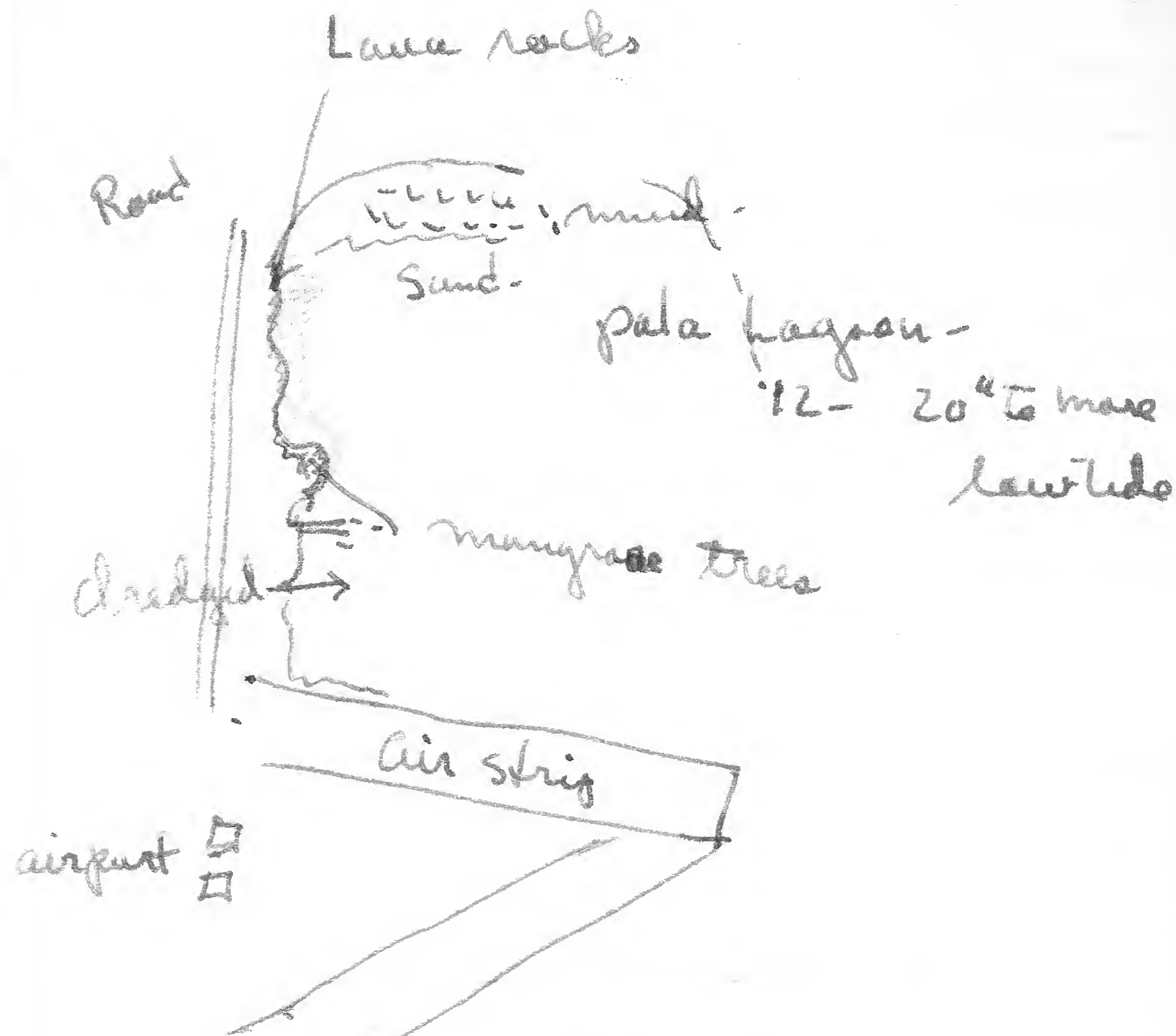
12 July 69 - This area visited with Dr Harald Rehder of the Smithsonian - Specimens in bath areas taken by Dr Rehder -

19 Aug. 69 - Again the surf was too high to permit reef work - low tide at 5 AM - area reached just prior to that, sky clear but a strong east wind prevented seeing below 8 inches - Specimens of Cypraea - Canus - Tridacna - Turban - Nerita - Palanus - etc preserved -

leafy
coral

limb

V
Tutuila - Samoa. ^{west} East side
pala lagoon. Tafuna.



25th April - This is a sandy bottom 18" deep at low tide - shore has lava rocks - mangrove - upper end of the lagoon is mud - many patches of green algae but repeated search revealed no shell or mollusks attached - usual assortment of black nerites on the rocks -

There were occasional tellin shells
and an occasional Cackle on the
beach -- There were several old
tires + pieces of heavy mechanical
equipment abandoned + dumped in
the water - years before - Saw one
eel - one small moray but
sand seemed devoid of trails - or
evidence of life - 1/2 beach search
showed a few small ancient gastropods
inhabited by hermit crabs -

Search attempted at nite - low tide -
little activity - but rain clouded
the water - so search abandoned

10 May 69 - Early morning search
at 0.1 low tide was no more
impressive than before - 2 hrs
search produced nothing not
found before -

July - Searched again - nite - low tide -
only a few nerites encountered -

VI.

Tutuila Samoa -

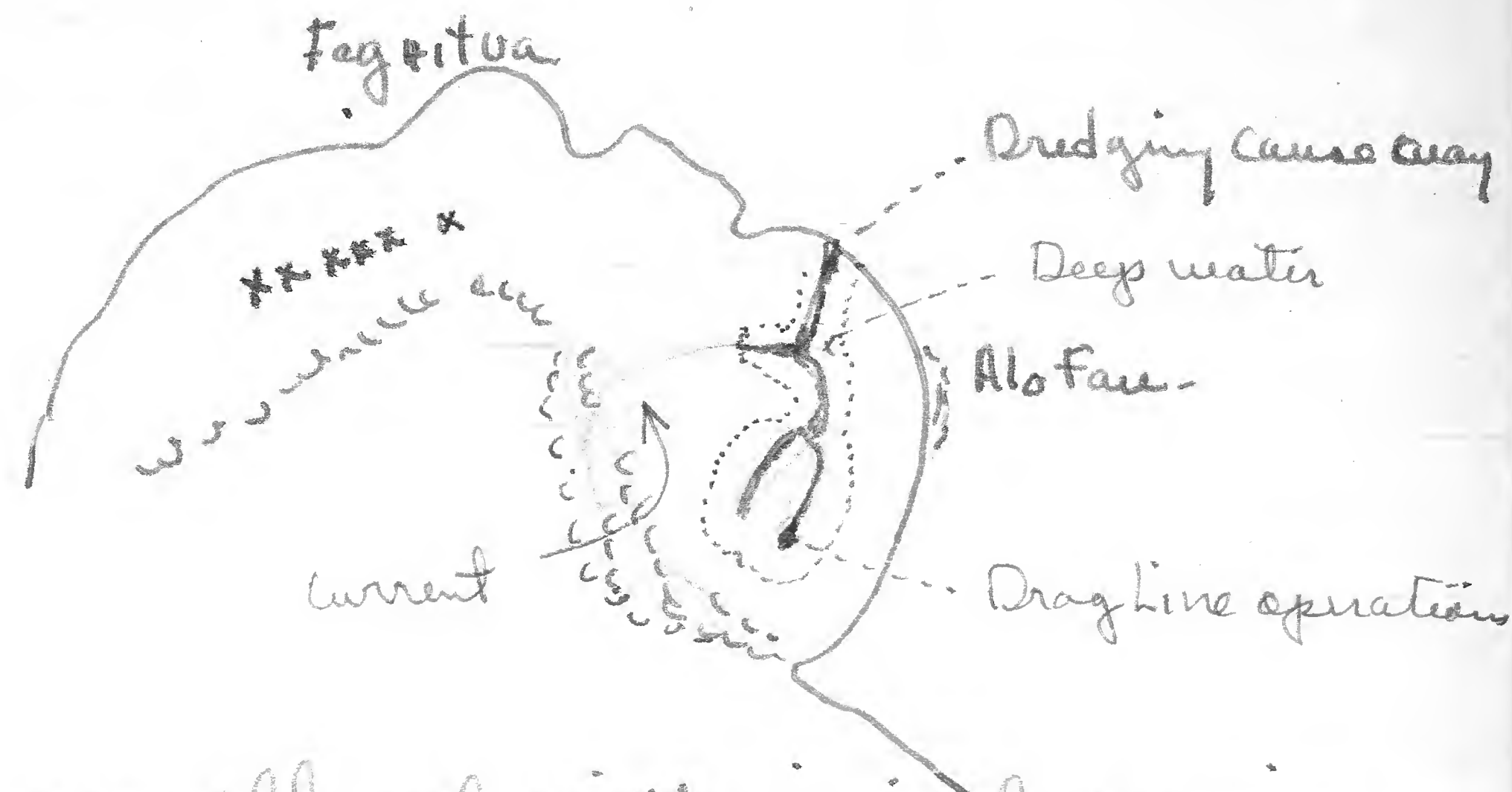
East side Fagaitua bay,

Apr. 69

This is a bay $1\frac{1}{2}$ mi wide 1 mi depth
Coral reefs lining the shore - a
certain amount of dredging has gone
on here, for possibly 10 years -
The coral rock road way constructed
out into the bay is now $\frac{1}{2}$ mi long and
100 ft wide - On either side are deep
channels - possibly 15' deep where
road way fill has been removed These
are not over 50 ft wide inasmuch
as the drag crane can't reach farther -
There are many shell fragments and
shells dredged up - as far as I can
ascertain most of these were dead
and had been washed in the hole -
There was no evidence of living
mollusks on the edge of this road way -

On 28 April this was collected,
tuna - For 3 hrs at low morning
tide - sunset at 9:30^{AM} and for one
hour at night - low tide -

9-10 PM -



very old reef with minimal growing
coral - many small canaries -
Cypraea moneta and a lot of hermit
crabs in tiny shells - Fragments of
giant clams on the debris piles -

19 July 69 - Another shore search revealed
my tapestry shells - prob - Turbo Reecei,
and Cypraea Vanelli - Some Turbo +
bivalves however the only shell picked up
thought to be unusual was a Rhomboceras
imperialis -

24 Aug 69. a group of us went snorkeling
where the group of 4 are - near

Fagatua - Results were not spectacular
aside from one large flat canch
with an orange mouth - This
specimen which was about 8"
across was unidentified - found in
10' water - sandy bottom by
John Flanigan - preserved by
injected alcohol -

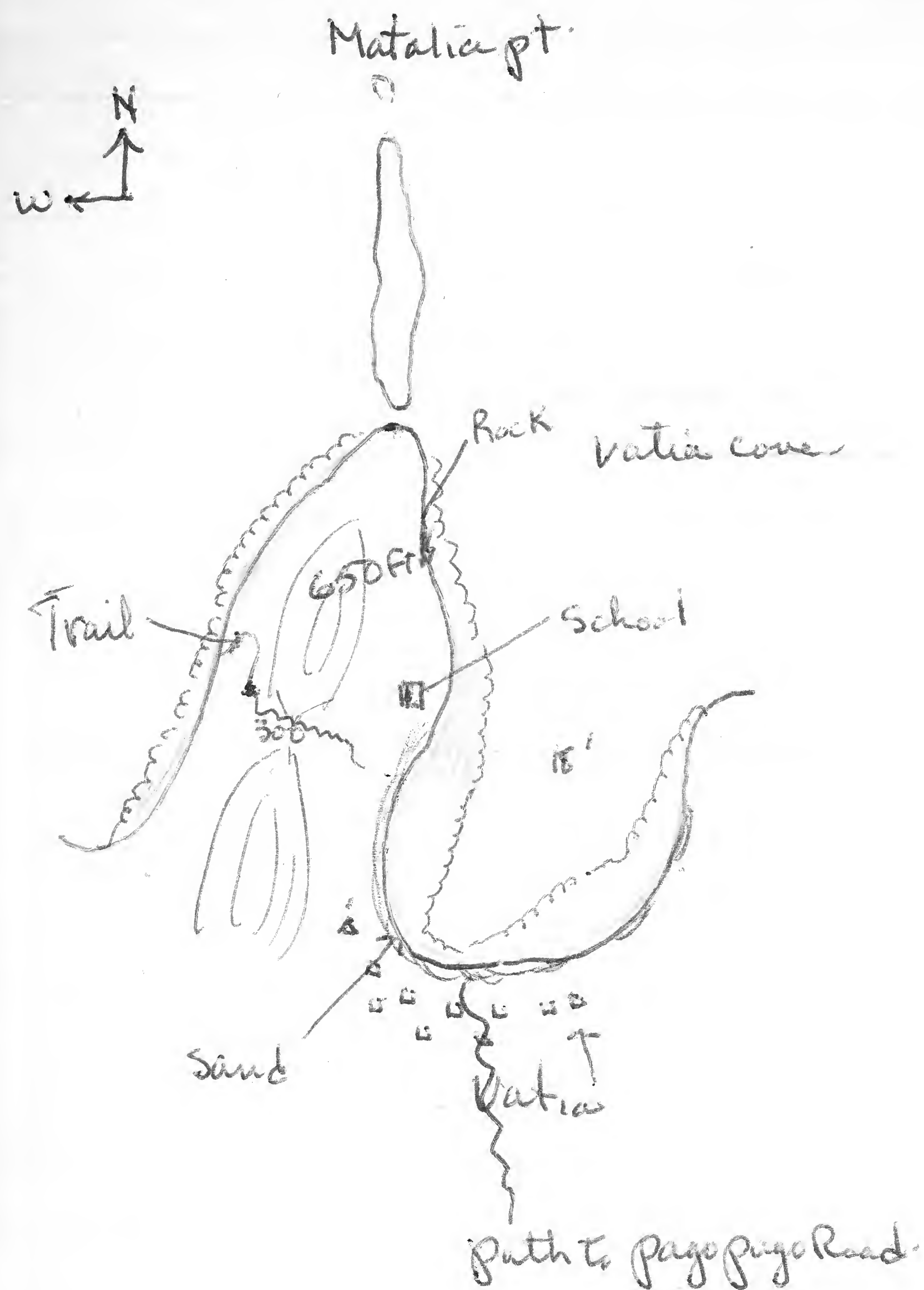
VII

Vatia - Tutuila Samoa

The north shore of Tutuila is
inhospitable for the most part but
there are 5 or 6 coves where there
are small settlements - Vatia is
1 1/2 mi from Pago Pago bay by air
but there is a 1000 ft ridge which
makes the area less frequented -

Vatia Cove is lined by a growing
reef - 100 yds wide - then a drop
to 18 ft - fed by 3 fresh water
streams - sandy beaches + coral
breakdown - smaller rocks on
the edge - near the shore are
many flat rocks + flat coral
under which there is protection -

This was visited and the area
near the school searched for one
hour - low tide - 11 AM -
water extremely clear - a few
live specimens taken and placed
in alcohol - 1 May 69



The area was visited from May 5 to May 8 when I stayed with the school principal Donald Douglass -

The area near the school was searched 3 times at low tide - no ~~tide~~ lantern available for night search - There were multiple small cyprae + olividae - with the usual drupa + nerite collection in the rocks however they were scarce except at the area marked rock -

The east edge of the cove was rocky and little unusual recovered - near the school One heavy shell-eroded + spiraled much like a volute - was seen - 6" long - very old + too heavy to trail pack.

An excursion to the west side of the ridge was made on 6 May 69 - 4-6 PM - low tide 1721 - 0.0 - There were remnants of Canidae + Cypraea in the rocks - The bank was composed of boulders - was very abrupt - There was a growing reef, the edge being 150 ft or less from high water line - Surf was heavy + there was no loose coral or rock to afford protection - most

specimens were beach shells - One humped back Cowrie, *Peribolus mauritiana calyptema* was found by a Samoan fisherman.

During the entire week winds were strong + constant - waves were high + surf constant.

VIII

Area 8 Leone Bay - Tutuila Samoa

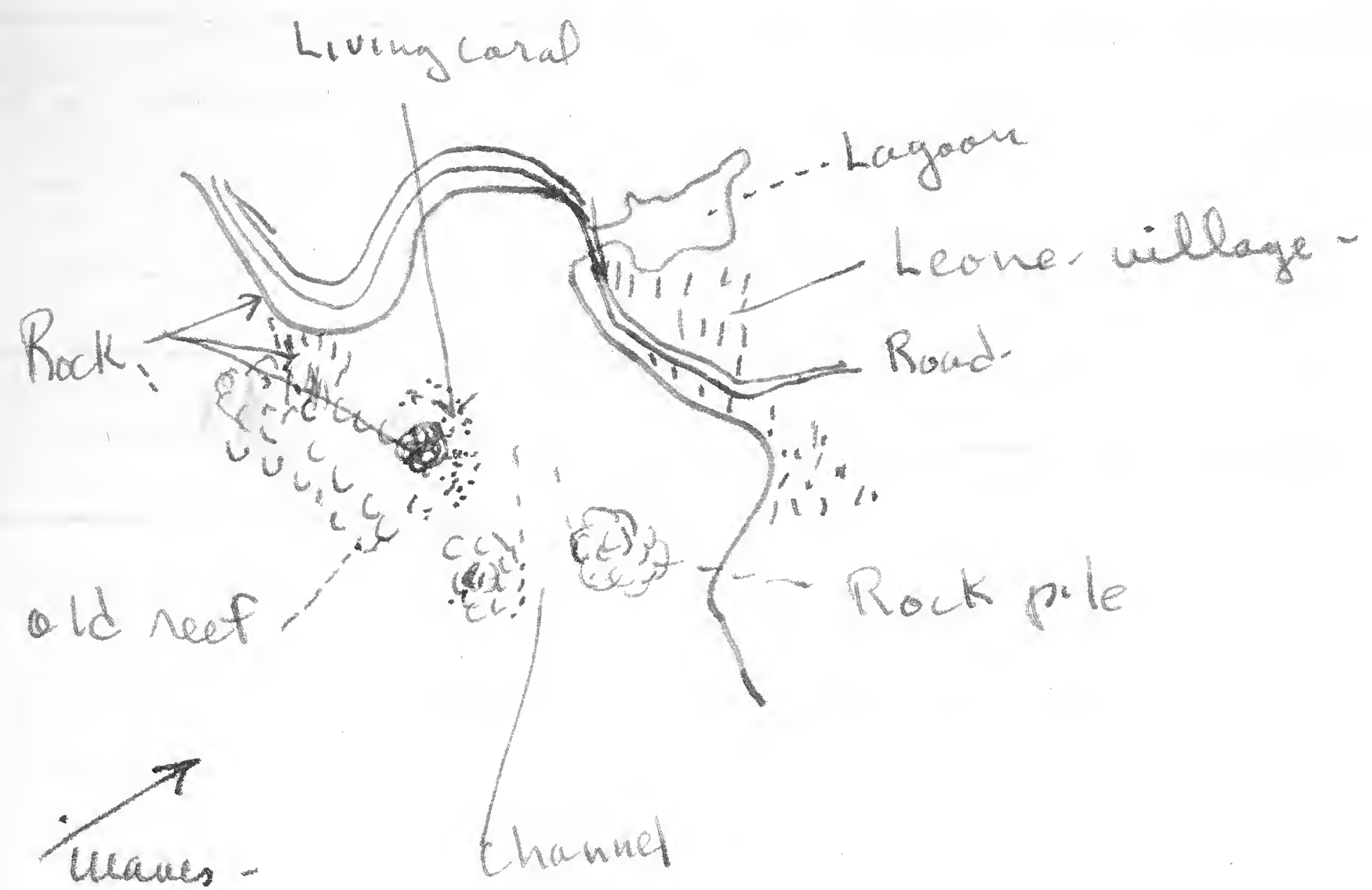
surf was high when this bay was visited and collected on 12 May 69. Cloudy - intermittent rain - from 1/2 hr before to 1 1/2 hrs after low tide.

The bay reef is composed of lava rocks with dead coral plates & other rocks about a central pile - on the vicinity there was a growing reef with much living coral however all specimens taken were in areas with little or no living coral.

There were very numerous golden ringed cowries - another collector from Leone found a reticulated Arabian Cowrie and 2 Geographic Cowries with the use of a glass bottom bucket in deeper water.

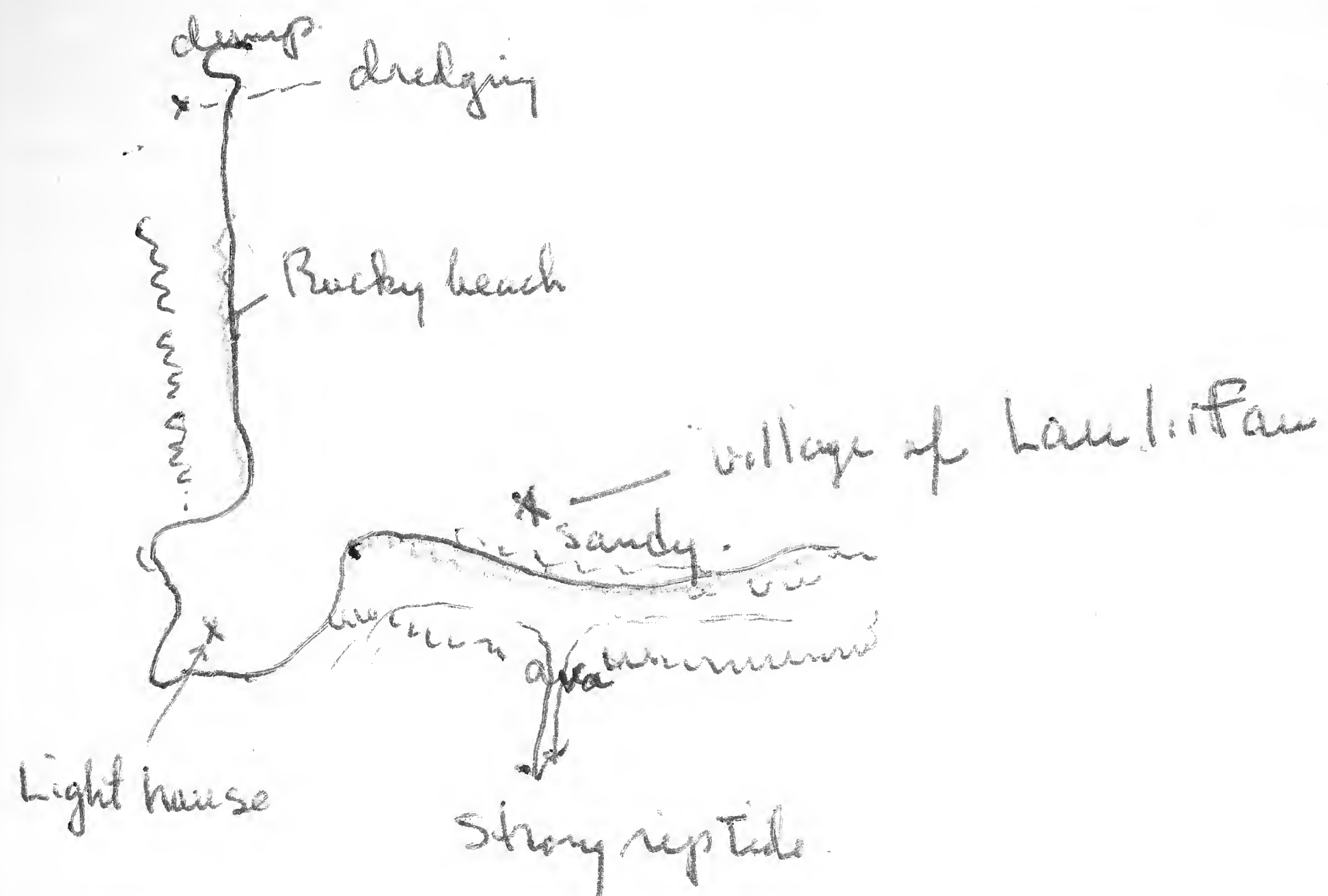
Specimens preserved were mainly Tritons - and assorted others with an occasional Cowrie.

(over)



Tutuila - Samoa - Area 9

About Breakers point - 10-11 May.



May 10 - preliminary beach survey
of this area done with beach
shells collected - water was very
rough & too high to enter even at
mid tide -

later attempts at inter search failed
because of a burned out light just as
search began -

Tutuila Samoa

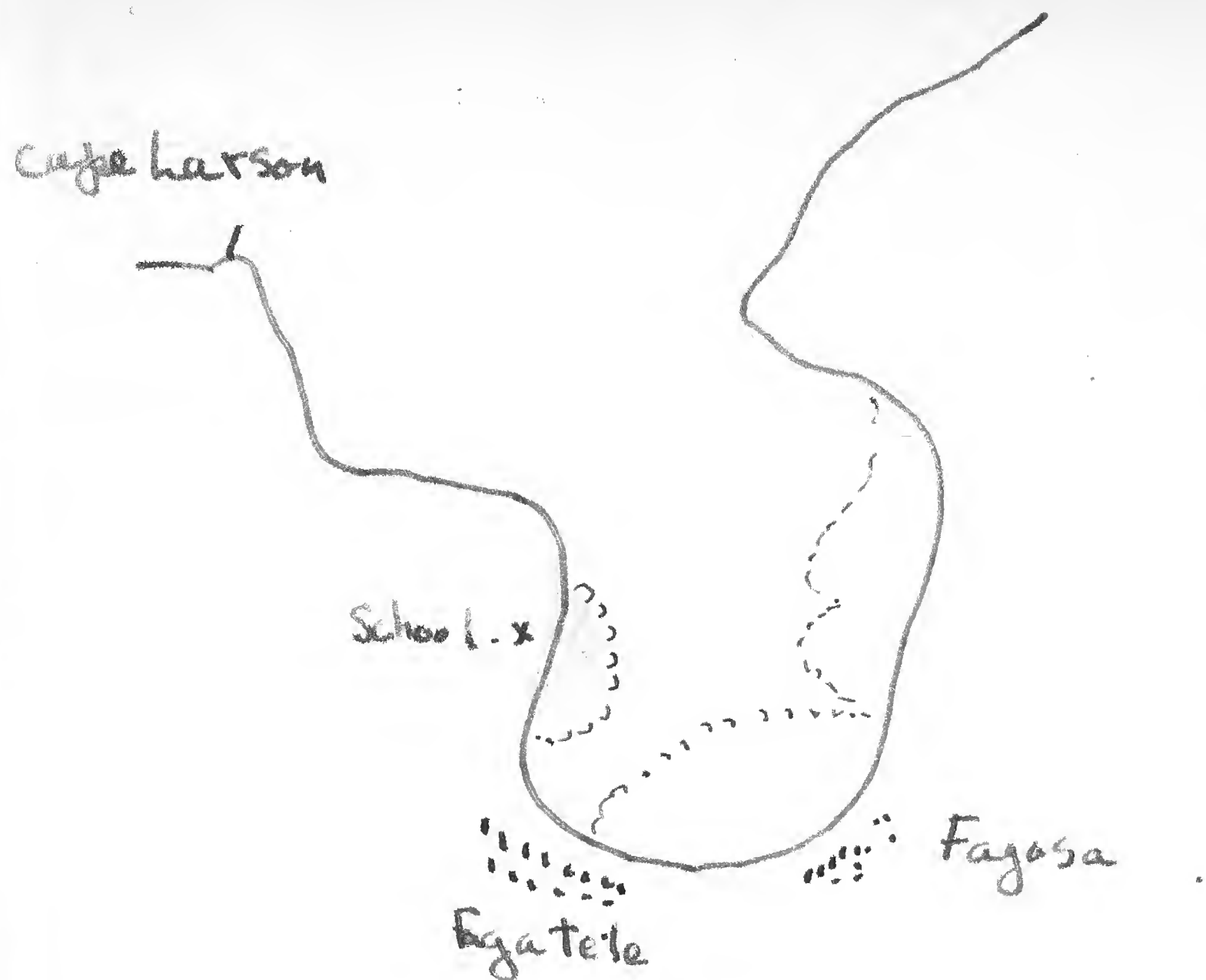
This is a north shore bay which can be reached by road - and has been occupied for hundreds of years -

There is some sand but mostly a fairly narrow reef - with little new coral - little coral breakdown but some lava boulders at the edges - Only the western portion of the reef was searched - at low tide - noon

14 May - little evidence of shell fragment
entire shore -

after 1 hr search discontinued - high
water - wind & rain -

Contacted the principal - Miss Emay^{Dunn} at
the school in Jajaleu - She had a box
of shells her children had picked up -
This included - *Pat perparadusta* -
Pissinista - *varananta*, *Staphylea*
neclius; *pustutaria* *ecoreula* -
and an assortment of the usual
Arabian - snakes head etc



14 July - Same area - searched - by 4 Collectors
at low tide - One with snail - The
shore area showed many drupa, most
common mollusc was *C. caput-serpentis*
and some of the smaller cones - 3 sets of
specimens preserved in alcohol - 2 hr search.

Area 11 aua.

(Ah-oo' ah.) - Titula Samsa -

This area is within Pago-Pago harbor.

There is a reef - of 200 yds - with some growing coral -- a few patches of Coral break down -- some sand -

There is a swift current even at low tide - This area was searched

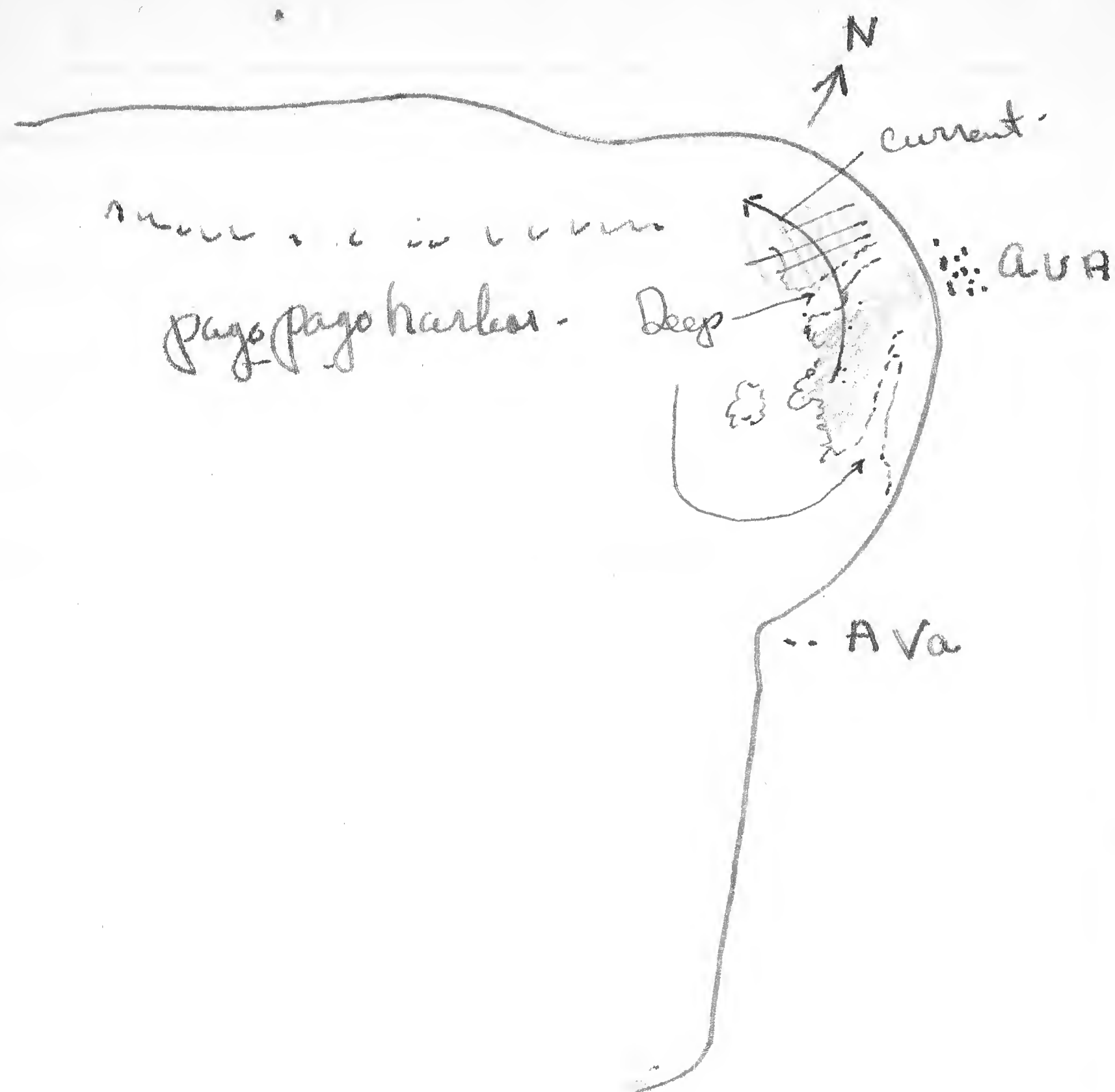
for 1 hr on the 15 May - There were many black holothurians - Some blue starfish - In several areas there were deep holes or trenches which may have been dug -

Search was done at low tide -

The one tellin was given to me by a Samsan who was digging them near the beach and around Toward Leas,

Point - nothing unusual was found. but the normal quota of small caurins, rock shells - etc -

~~22~~ July - May - a nite search was begun here but terminated abruptly when my light went out -



30 July 69. The sandy area - north of deep -- marked with cross hatch was explored - 10 crabs - 2 *C. maclifera* - several small strabuses - two *Terebra maculata* - a *Conus virgo* found - none preserved in alcohol.

4 Aug 69 tide low tide search - wind of 15-20 knots obscured everything -

Western Samoa -

May 69.

Area 12.

The Apia harbor has been dredged and is filthy - The beaches are dark brown sand, partly contamination, part from the lava content & from the effluent of a river that is brown and murky.

I saw no rock shells - (nerites) - along the rocks in the inner harbor - The first collecting area is labeled #12 and consists of the original Coral head stretching 300 yds out - The shore line is dark sand - The first 100 ft the bottom is slippery brown ooze and beyond this for 100 ft is coral breakdown - the bottom consists of a thick layer of Calcareous sediment - no sand - In this area were occasional heads of growing solid coral - Beyond this were many areas of stag horn coral all blue tipped - to the end of the reef where the bottom was solid coral breakdown - water temp was about 80° - very little current from the moderate surf but some current

generated from the Eastern Trades which blow almost constantly & give enough waves to be troublesome - The tip of the reef is exposed at low tide however at low tide the area is usually covered from 18" to 3' -



First collecting on 19 May was done North from the light in coral breakdown area. These live specimens were preserved in ethyl alcohol - no shore specimens taken - low tide -

9 AM
20 May - using snorkeling equipment
the inner basin was searched for
2 hrs - at high tide -- If there were
trails they had already been obliterated
Fanning raised such a cloud of debris
as to be impractical - Several specimens
of Cones were obtained -
labeled as to date -

20 May. Seeding search 3:30 to 5:30
with low tide at 4:30 - Search to
the surf line skipping most of
the intermediate area - - Large chunks
of Coral turned -

Specimens preserved & labeled as to
date - water was clear but
running with the wind -

a shore search was then made
and this was assisted by samoan
youngsters who lived on this beach -
All shore shells & dead shells found
were put together - & dated -

21 May -

In the Area labeled 21 there was
a patch of sea plant which reached 16"
at mid tide to float on the surface - The
small leathery leaves were olive - gray
& color - many attached to chunks of coral -
much broken calcareous debris & mud
however this gave protection so the water
was calm & undisturbed surface seen -
a single Pima discovered - a Samoan
gave me their name for it & said it was
good eating - a few small strambidae
were found - Then a patch of 100 yds of
growing coral however no single specimen
was found either under boulders - or in
among the coral - The search was
terminated by a shore search almost
to the light - 2 chitons found in the first
mentioned plants - many very weathered
Cones & Conures seen - too moss covered
eroded for identification so not collected -

27 May - 2 hrs at low tide - the extreme
edge of the reef - collected - Two green
turhans seen - not taken - a reticulated
Conure - a textile cone and a few

small shells found - There is exposed
growing coral but no loose coral plates
+ no evidence of molluscs and on most of
the edge of the reef - The inner portion of
the reef contains only coral breakdown &
no molluscs seen - even crabbed ones -

- 4 June 68 - a party of 3 snorkeled the
Palolo deep area for $1\frac{1}{2}$ hrs at
high tide - which was at 10.14 AM -
The area of 100 yds to the deep contained
coral litter with occasional new coral
growths - Calcareous debris but no sand -
There were star fish - sea urchins,
holothurians but none abundant - In the
deep slope was stag horn coral and
other forms - visibility was perhaps 75'
with much suspended matter in the water
many fish seen but no molluscs
were found or collected which had not
been previously seen here & collected -
There was a sloping plateau of perhaps
30' which gradually deepened toward
the area where the deep penetrated the
reef -

Area 13 - Upalo Island.

Matautu, Lefaga Bay area.

South coast of Upalo is less inhabited than the north coast - The reefs are not as broad - The sand is white.

Matautu is a village about a mile from the search area which actually has no name - It was a 1000 ft stretch of beach with patches of sand and large stretches of black lava rock on which the surf beat heavily -

The ocean floor at the sandy area deepened sharply and at 20 ft was 6' and at 400 ft was 10-12 ft with several large coral heads - farther out - perhaps 300 ft - waves were breaking on a reef - Most collecting was confined to a shore search - Snorkeling was attempted but the current, + high waves made this impractical - a bottom search showed a Hebrew cone, drupe shells, trachurus etc however no living molluscs were seen. Some live specimens collected from tide pools + rocks. Labeled # area 13.

Date 21 May 69. - Time 1 hr



Area 14. Upolu Island
Samoa -

Mulinu-u. point

There is a long sand peninsula jutting out of the north coast of Upolu about $\frac{1}{4}$ mi wide and more than a mile long - This is shown on large maps and is at the entrance of Apia harbor and marks the western end - To the east is a mangrove swamp - On the peninsula are graves of several high chiefs - the parliament house (Fono) - radio station - and the meteorological observatory at the tip - Mr Philip Mueller the director knows the reefs and put me in touch with a Samoan Fisherman Mr Edward Williams - of Indian Samoan descent raised & educated in Fiji - He lent us his 2 man Paopau outrigger.

First search was on 23 May 69. from 6 AM to 10 15 AM - Low tide at 7:18 AM.

Surrounding the end of the peninsula is rather dark brown sand with numerous shell fragments - small - strambidae, clams, etc - This drops

off rapidly to deep water - 8' - 10' deep which possibly was the result of dredging - I couldn't confirm this - About 200 ft out water is 30" at low tide - bottom is sandy with occasionally some small plants and a small bit of coral - or sponges -

Going N. E. - at 500 yds is a tide gauge building - About this area live coral begins - stag horn and some smaller coral heads - all underwater at low tide - This area is perhaps 200 yds wide - At the edge of the reef is an area of coral plaques, breakdown etc..

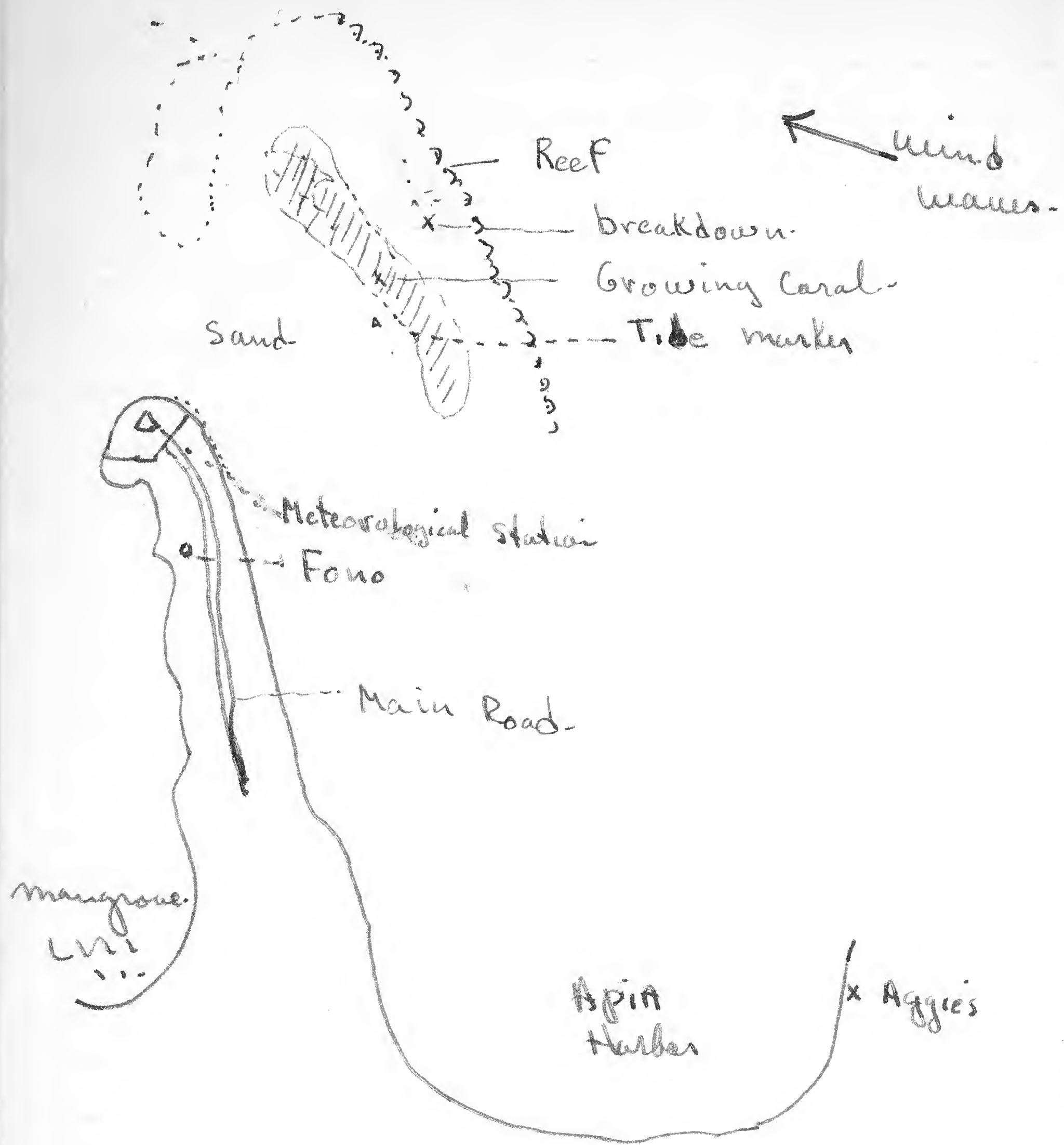
We set out at dark & reached the outer reef about sun up. Eddie, though a fisherman knew nothing whatever about shells or hunting them but spoke good English - The coral breakdown was searched for about 2 hrs. - Eddie found a $3\frac{1}{2}$ " *Stombus* - Several *Conus* - *Geographica*? - Small *Cypraea* *moneta* + *Gammulus* - Some small *murex* - *drupa* - etc were found. Finally from the paupau a slow search was made toward the point. - Nothing was seen in the live coral - but as the sand came -

a single *Terebra crenulata* - L. - shell was found - Suspected trails were investigated but nothing found - Several Callars of moon snail seen on the bottom - All old - none recent - no shells of moon snail - 3 shells *Conus marmoreus*? all rather small - were found - Then an area where there were many *Perna* - At times up to 10 per sq yd - This area was 100 yds across - Several small *Strombidae* + *Bulla ampulla* seen - Several shells of *Idenicardium* - L. and a few other *bivalves* seen -

Shells were ~~pre~~ dried + mollusks preserved in Ethyl alcohol - labeled - area 14 -

Time - 4 hrs

Temp 76° - Water temp - about 80° -



Area 15

2" = 1 mi



North west Molinou point.

26th May - 69 - at 8⁰⁰ AM via Pappas to the reef about a mile beyond Molinou point - This was composed of a shelf of live coral 100' with a reef of heavy coral rocks for 100 ft - then coral breakdown & debris for 200 ft followed by staghorn coral - Low tide was 9.06 - Many *Cypraea reticulata* were found - also *Cerastis serpentina* but only under the heavy coral - none under the coral breakdown or new coral - This area searched for 1 1/2 - 2 hrs - both myself and Eddie Williams - By that time the water was returning so we drifted over the live coral but surface was too rough to see -

Finally an hr of snorkeling was done - gone to the East & drifting with the current - twice - near the shore the water is 8-10 ft deep - but out 200' it is 24" at low tide = 5' at high tide Bottom is undulating - Calcareous crust - May star fish - pen shells - An occasional collar from a moon shell. Water was generally turbid & visibility under water maybe 100 ft -

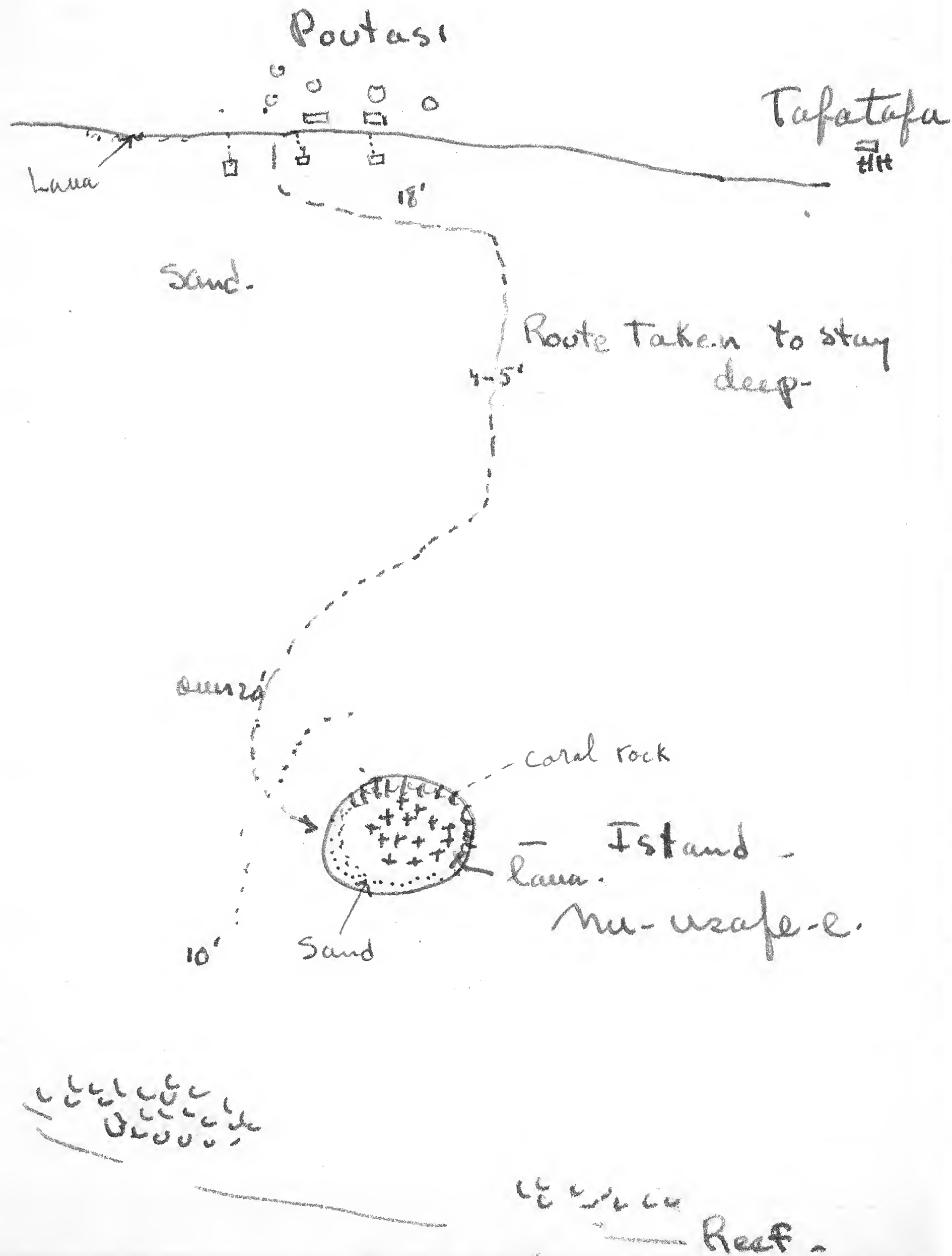
at ...

There were very few weeds -

Area 16.

Area 16

Nu'usafe-e Island.



On May 27 the village of Poutasi on the south shore of Upolu was visited and thru the village physician - Dr Fate, arrangements were made to visit Nu-usafe-e Island.

Low tide on 28 May was 10⁴² - AM. Poutasi shore line is lava rock & dirty sand devoid of shell remnants - 2 Paopao (outrigger canoes) fisherman took me thru a circuitous route which avoided shallows & coral to the island which is about 3/4 mi. from shore - There is probably no way to wade to the island - the lagoon within the reef was in part very deep with large coral heads - in other parts it was sandy from 18" to 6' deep - In the village Cypraea tigris were seen -

The island is coral with lava rock on the windward side - The leeward side was sandy - palm trees - figs on the island. ^{almonds}

The beach contained many shell fragments - ~~with~~ One fairly good Cypraea tigris shore specimen was found with a good variety of

others including a *Cypraea felinus* -
while the tide was low one of the
fishermen rowed me to the reef - It
was old coral plaques with much
coral debris but no sand - no
algae - and very little mollusc life.
The fisherman found no ~~shell~~ molluscs
but did find an Octopus - This area
was searched for $\frac{3}{4}$ hr -

The island was again reached and
then I walked around it - Very few
nerita on the coral shores - The shore
fell steeply on all sides with no
in shore protection for molluscs -
I had been told that turtles did not
nest on Samoan shores but I found
a discarded turtle nest - empty eggs -
total time of search - $2\frac{1}{2}$ hrs -

The beach at Tafatafa was searched
but nothing found - (brief).

Area 17.

Upolu - Samoa - Namua Island -

The road to Alepata district of Upolu is bad - & resembles a Colorado mining road so that it took over 3 hrs to reach the town of Malaela -

This trip was made on 29 May with the help of Vincent Halleck, a Mormon missionary - also Samoan, who arranged for a fisherman to accompany me.

The reef at Alepata is about $3/4$ mi from the shore and the east side of the small island of Namua forms the edge of the reef - This island is a hill about $1/4$ mi across - The sea side is lava in part with no reef, - In other areas there was a 100 ft growing reef but behind some lava rocks were some coral plaques under which a few molluscs were found - The rocks themselves had few drupa - few nerita & few crab shells -

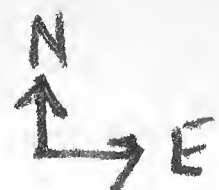
There was a 200 yd sandy beach on the outer edge of the island which contained abundant turban fragments, some weathered *Cyprina maculifera* & *Cyprina*

caput serpentis - The lee side of the island contained very few shell fragments - One section was eroded coral with no molluscs - *Conus ebraeus* - not taken.

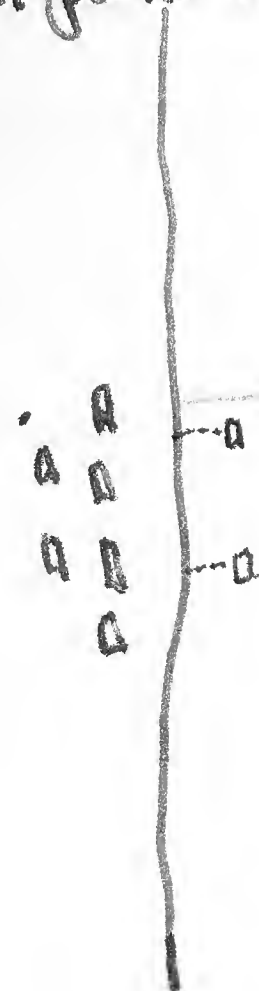
I was taken there by Pa'i Schwenke a Samoan fisherman who apparently is a good fisherman but his knowledge of molluscs & shell fish was abysmal.

The lagoon between Namua and the beach has some live coral but as nearly as I could see it was sand - water was 4-6 ft at low tide - On the beach was a fragmented old *Conus betulinus* -

Collecting was done between 12 noon and 2 PM - Low tide was 11:30 AM. which we missed because we underestimated the tides -



Aleipata district



Lagoon.

Fanuatapu Island

Waves.



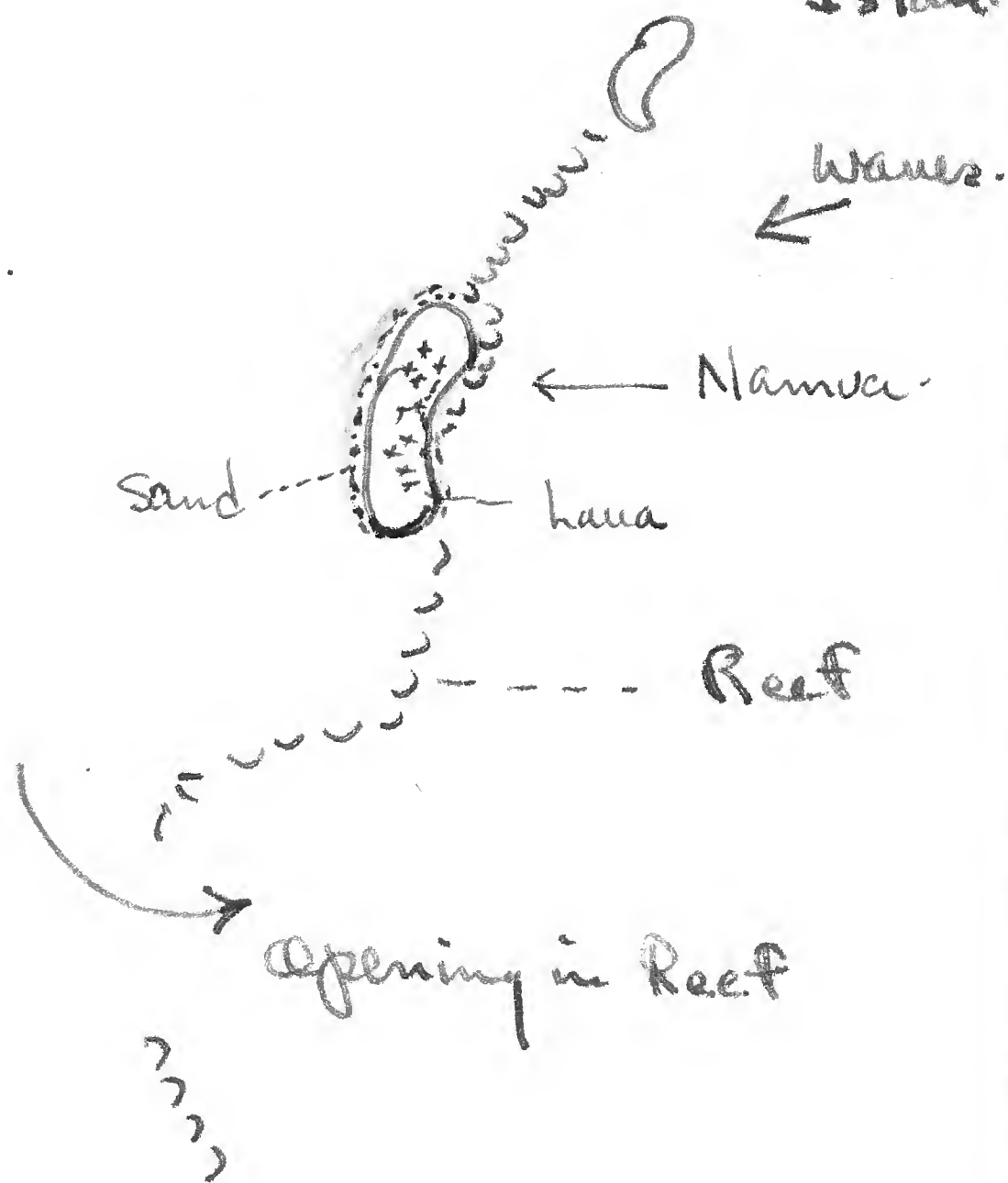
Namua

Sand

hava

Reef

Opening in Reef



Area 18

Monono Island - Samoa -

This is a low coral + lava island to the west of Upolu - about $1\frac{1}{2}$ by 1 mi in size - It lies within a protecting reef which extends out from Upolu - and apparently has no high surf - The shore line is coral rock in part - much sand - and in the area we searched there were lava rocks - with white sand beaches between - each beach stretch being perhaps 100 yds in length -

There were numerous reedy plants off shore in water 18" to 5' and 100 yds off shore the water reached 10 ft - The bottom here was undulating sand + calcareous deposit so that when disturbed there was a huge cloud - ~~no~~ starfish occasionally - Some holothurians; an occasional large coral chunk - much marine life but no growing coral -

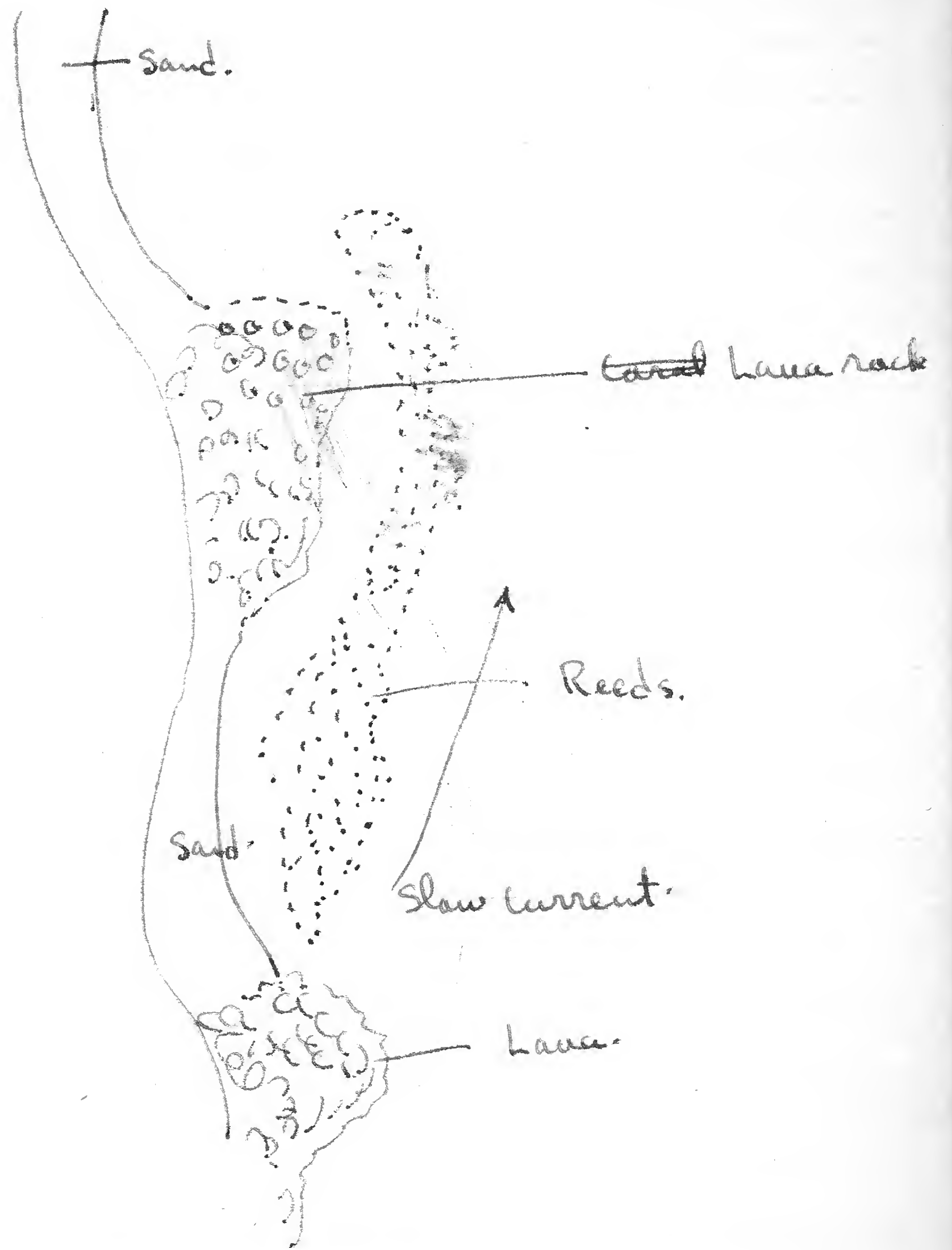
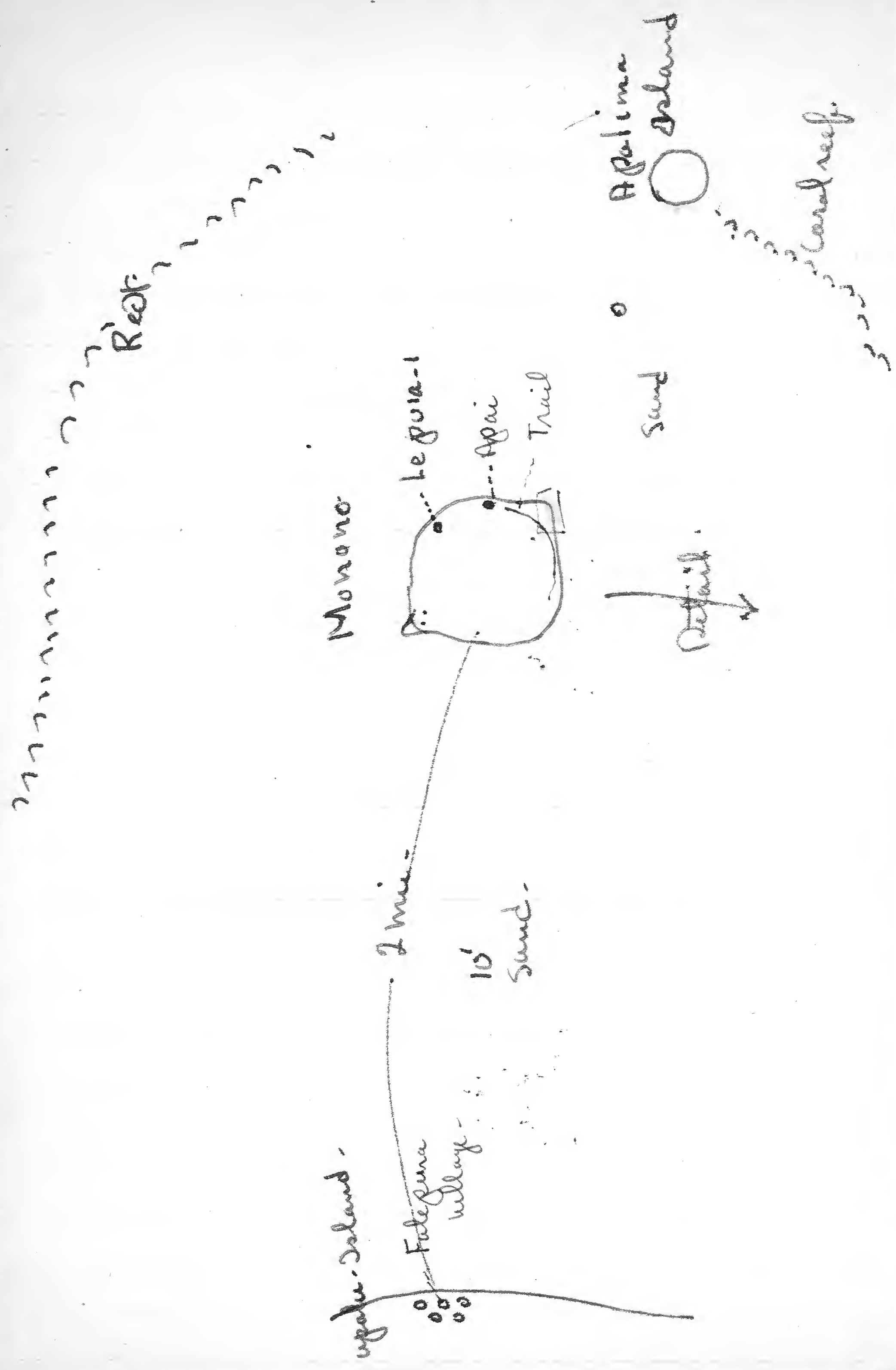
The area was searched over a 200 yd stretch with snorkel + shore search - at low tide - on 30 May 69

The reef was far out and inaccessible to me - From what I saw there was little evidence that molluscs were plentiful and I saw none except for a child who was trying to sell 2-5 inch black flat bivalve shells with an inner pearly luster - I couldn't find out where she got them -

~~Triton~~ Charonia tritonis apparently present in the lagoon - a child tried to sell one to us - and I found a beach worn shell of one -

During the search numerous pinnas were seen but not collected - They appeared similar to those collected in Upolu -

$1\frac{1}{2}$ - 2 hrs - search during 6 hrs spent on the island



Western Samoa - Upolu - Faga'ali-i-

June 3. In this area there is a double reef and a party of 4 of us explored the inner reef for 2 hrs - low tide was at 3¹² - Search was 3 to 5 PM. The outer reef is approximately 1 mi off shore however there seemed to be a break in the reef opposite the area we were - The intervening lagoon apparently was very deep but devoid of heavy breakers -

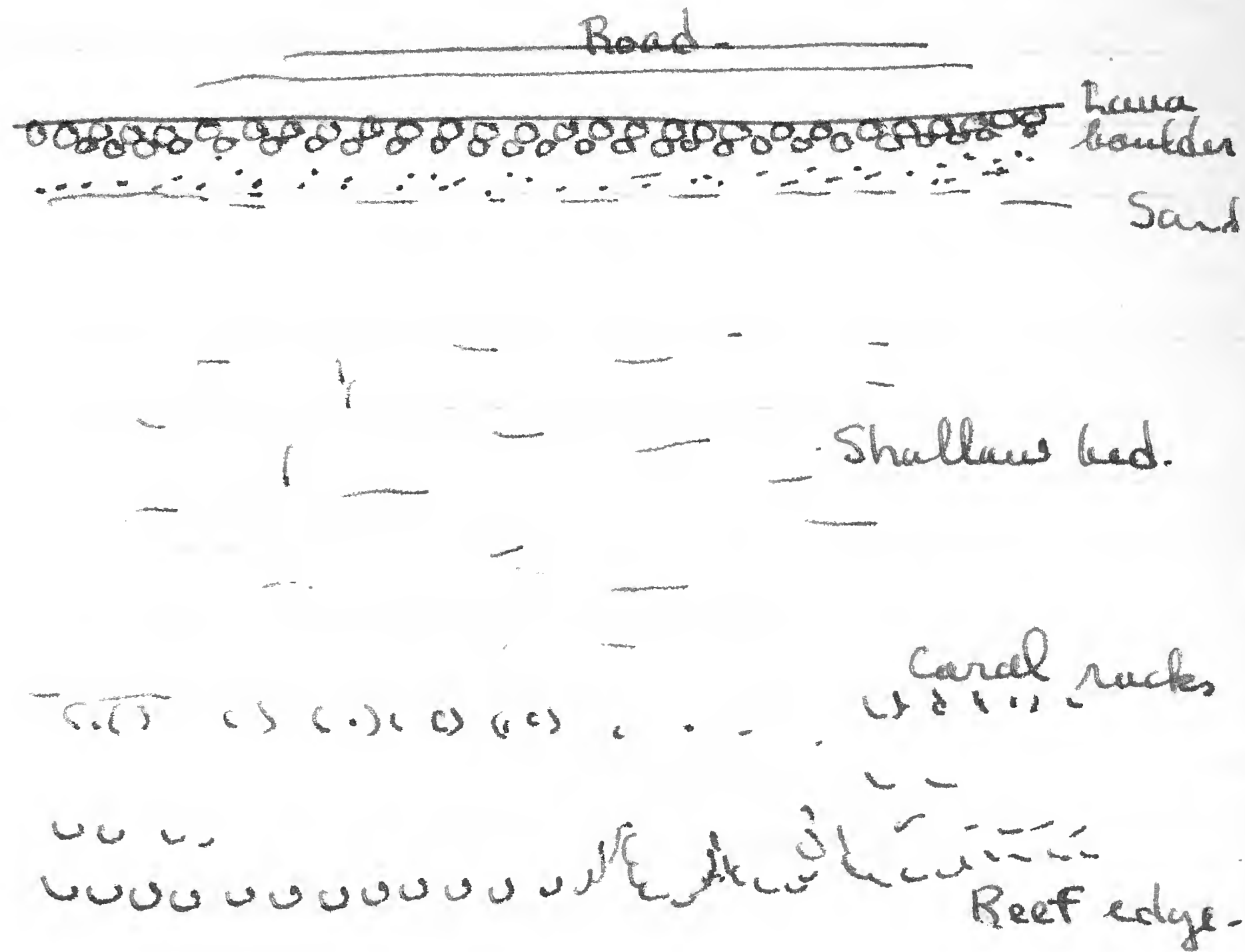
There was a sandy shore but no shells or shell fragments were found on it.

At low tide the water for 75 yds was 6" - 12" deep with a slight current - Bottom had coral plaques - with sand beneath same - Several *Comus textile* were found here and one *Comus nusselti* -

Next were heavy coral rocks not covered at low tide - Several *Cypraea maculifera* + *arabica* + one *Capulserpentis* found with several *C. crassa* - A few other frequently found specimens noted - Then came the living reef which

was fully exposed to its edge - There
was abundant live coral but no
specimens but on Conus. (?) Rattus found

We crisscrossed an area of about
100 yds of beach front.



a tour of the island of Savaii was made -- virtually the entire island has either lava banks or sand beaches on which the surf pounds - On the north shore is a reef with a lagoon but made of travel prevented any exploration of this area - a limited shore search produced only broken turban shells, broken Cypraea remnants etc - none of these were collected - no shells were seen as decorations in the Fale visited -

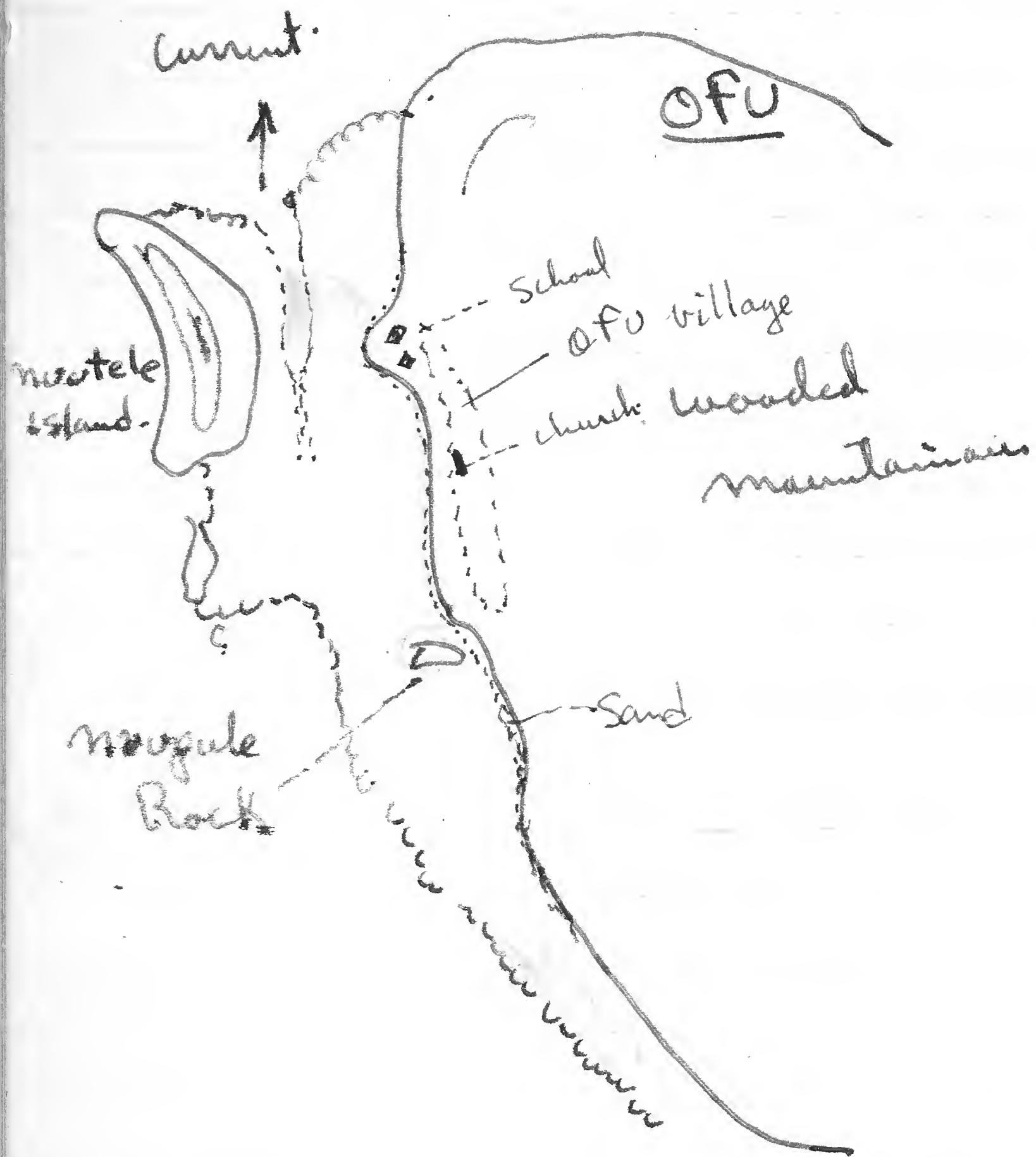
Area 20.

Manua Islands - OFU -
14 June 1969.

This island is one of the lesser of the Manua group - which lie 60 some miles from Tutuila - east - a 6 hr visit was made to OFU. by government boat Manuina -

The island is trigangular - 3 miles long - about $1\frac{1}{2}$ miles across the base - it is volcanic - a peak of 1621 ft - It is surrounded closely by reef but on west side is a small uninhabited rocky island called Nuetete - a 300 yd channel with a deep center gorge separates this from the sandy west shore of OFU where the village is located.

a shore search was first made of the south sandy beach interspersed with lava piles - remnants of green turban shells found - little else - - Mupile rock circled at approaching low tide - finally I waded to the edge of the reef over solid coral to the reef edge where there were old coral plaques - This area was searched for an hour and finally shore search was continued -



afternoon - a low tide - partially exposed coral rocks were explored out to the deep center - Several *C. maculifera* found - One shell of *Turbo petholatus* - Using a Snorkel 3 of us including the OFU school principal Mr Dan Kniff explored the deep center channel which was up to 30 yds wide & to 20 ft deep - Found no traces of shells or molluscs - Mr Kniff reported a remarkable dearth of shells about the island - I'm sure they may be present but our equipment did not include diving gear - to go over the reef edge - Snorkeled for 1 hr -

Many small specimens preserved in alcohol - no separation done -

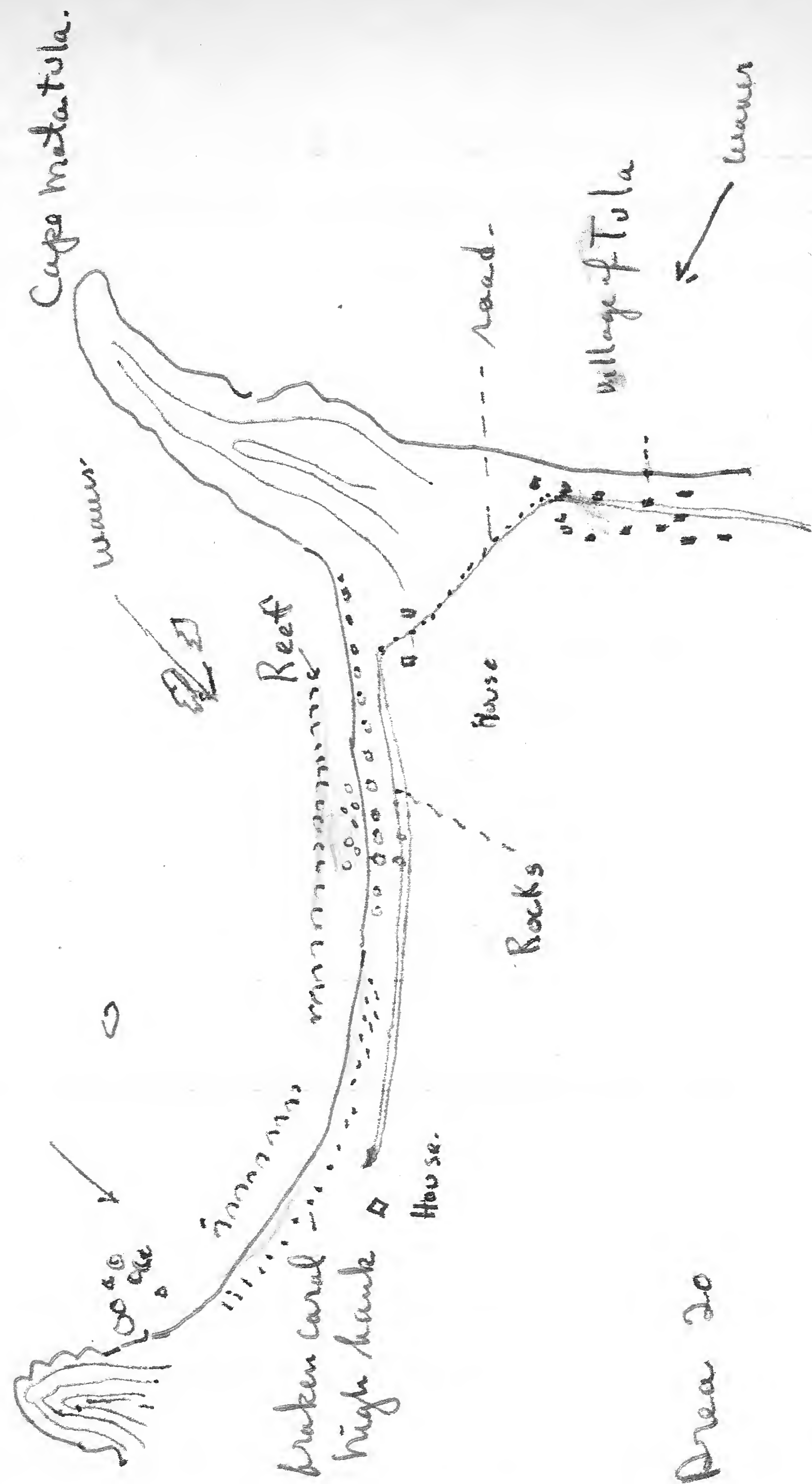
Area 20 -
Maupua reef, Tutuila, Samoa.

11 July 69

This area was visited by Dr. Harold Rehder of the Smithsonian, myself and 3 daughters on this date. Low tide was at 11:33. - Our car was parked at Tula and we walked to the reef arriving about 11:30 - Waded and collected from then to 2:00 at which time the tide had begun to return and another hour spent in shore rock and shore collecting - All specimens for preservation were taken by Dr. Rehder.

There was heavy surf from the SE at Tula and the point of land did not obstruct it all - This growing reef was about 75 yds out and 40 yds wide - Then came an area of break down with sandy covering in some areas. There were rocks of black lava lining the shore and in the shallow water - Water was very clear - Temperature 80° -

N ↑



Area 20

Area 22

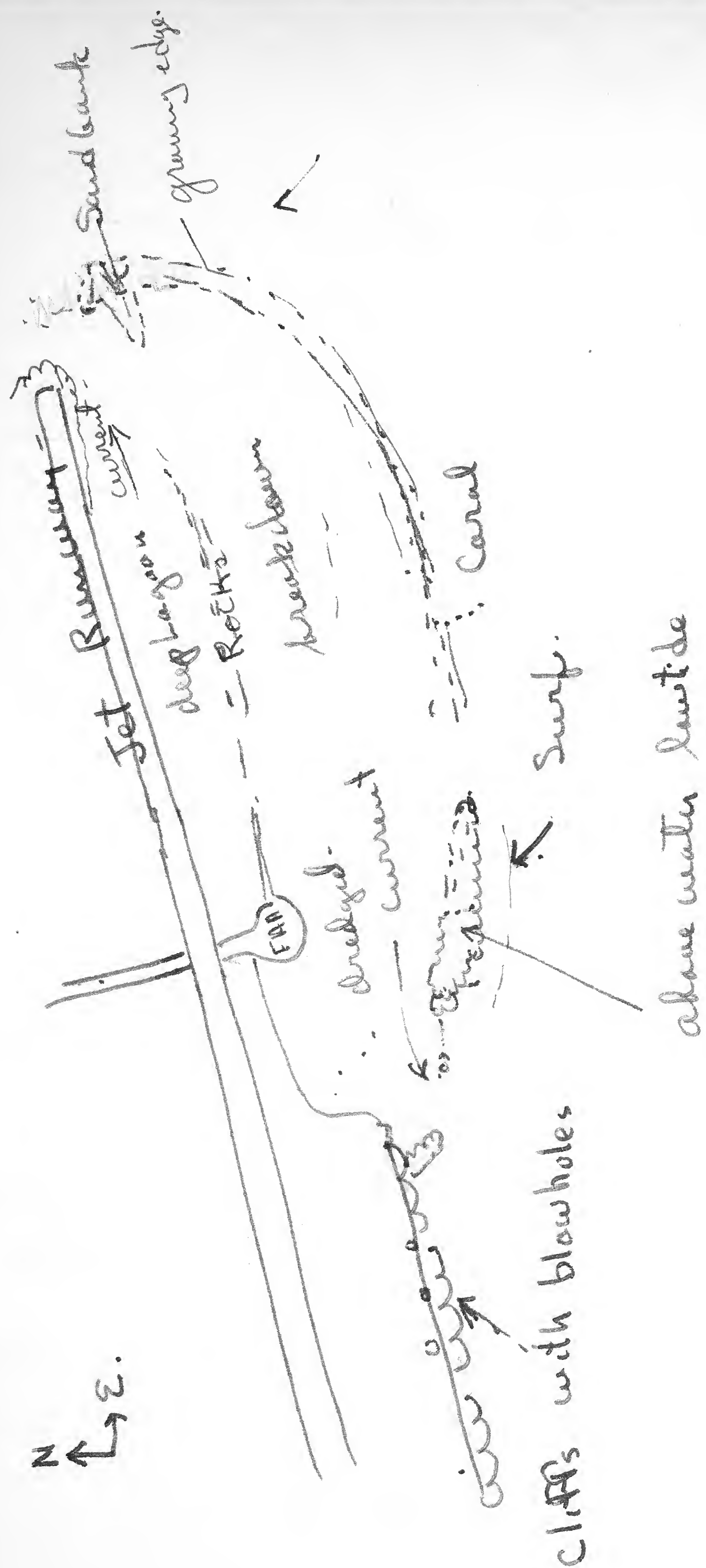
Tutuila, Samoa - Point Deceit -

This area is south of the international airport -- The long jet runway was built behind a coral ~~shelf~~^{reef} which protects the Pala lagoon.

It curves to the east from high lava cliffs in which there are a series of remarkable blow holes.

The first part of the reef only was explored on 19 July 69 and a number of specimens obtained, none unusual. -- This part of the reef had a shelf of perhaps 100 ft from the edge where heavy surf breaks constantly. -- Then there is 100 yds of broken coral plaques - mostly large ones - which are above water at low tide.

At the west end there were numbers of *Halimeda periphyria* - There were green turban - *Drupa* - *Nerites* - 2 *Conus* snails, a few very small *Conus* - An *Archieleia* *Caurie* -



21 May Another search revealed more of the same -

23 Two of us attempted the reef at low tide however the surf was so high it washed over the entire reef - and Maria on the lee side was knocked over - so we retired without specimens.

27th July low tide - it was found that by walking a mile to the edge of the runway - we could cross in 16" of water - there area of coral tufts - about 100' to the sand bank and on to the reef - The fauna was not unlike that seen on other reefs - One specimen of *C. Helvola* was found - On the bank 2 empty shells of *Testudinaria* found plus a 5" *Corvus litteratus* - within the lagoon a 1' *tridacna* embedded in coral was seen - probably *gigas* - Specimens were put in alcohol -

28th Same reef visited - specimens not unlike that found before -

29 July The west end of the reef was visited at low tide - 1-3 PM - by 3 of us - a search of the lagoon on the upper end revealed a bottom of broken coral - an occasional *Perna* was seen. Some *C. annulus* - & *C. moneta* - with small shells & crabs -

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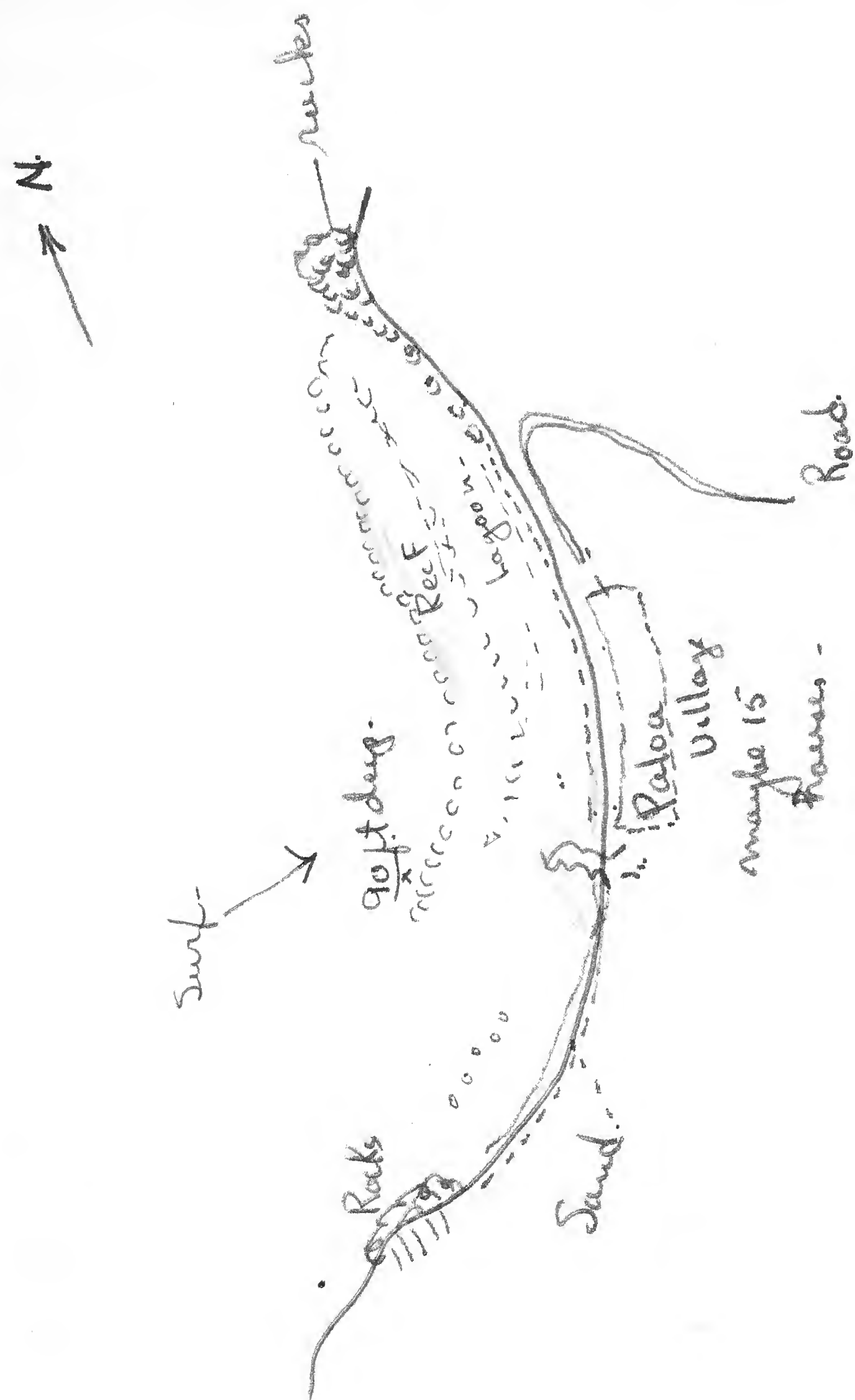
21 Aug - Calm - low - morning tide however the swells were still breaking at 10 and 12 ft releasing such a surge that only the most limited search could be made - On one point of the beach-shore shells of *Cypraea testudinaria* and *Argus* are consistently found however the live animals can't be found -

Area 23

Tutuila Samoa - Paloa -

Paloa bay also called Hubner Bay is on the extreme western end of Tutuila. It is partially protected from the South east Trades & the heavy surf - It was visited for first time on 26 July - and 4 of us collected for about 2 hrs - at low tide - 11-1 AM - There is a sandy beach - with a shallow lagoon - with some coral plaques & some rocks - but generally bottom is sandy - - This had 6" of water at low neap tide - beginning at about 70 yds was a reef of growing coral - about 50 yds wide - It was in this area that major collecting was done - Representative samples were put in alcohol - A single *C. mauritius* was found, the first collected by me since April - not preserved in alcohol -

A shore search was also done - One large broken shell - probably *C. tritonis* seen - plus the usual assortment of *Canus*, *Cypraea* - etc -



From 26 July - to 18 Aug the wind was constantly high with surf of 6' or over at all times - Several attempts made to reach this area but reef always under 1 ft of water or more - a search by 3 people from 3 PM to 6 PM on 18 Aug 69 revealed only a limited assortment of specimens other than very many *Cypraea annulus*.

